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## The Effectiveness of Various Forms of International Experiences on Students

### Achieving a Global Perspective

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#### **ABSTRACT**

International experiences are being increasingly viewed as important components of undergraduate engineering education. Yet little has been done to define global preparedness, specify alternatives for achieving it, or determine to what degree being globally prepared is the result of personal attributes, prior experiences (including pre-college), or specific educational experiences. Nor do we fully understand how the various international options available to undergraduate engineering students actually help them become more globally prepared.

As part of a collaboration of four universities, we are investigating how the broad spectrum of international experiences both in and outside of formal curricula impact engineering students' global preparedness or perspectives. Our research has included an extensive Delphi survey with subject matter experts, followed by an analysis of students at our four institutions. Currently we are conducting a larger survey of engineering students at a dozen representative universities across the U.S. We are using a comprehensive survey instrument that captures demographics, experiences and a measure of each student's global preparedness, based upon the nationally normed Global Perspective Inventory. This is enabling us to identify changes in global awareness, knowledge and thinking over the course of the students' transition from incoming freshman to graduating senior.

Specifically, we are focused on better understanding how the various international experiences both inside (curricular) and outside (co-curricular) of formal coursework impact students' global preparedness. This is timely as 21st century engineers are being called upon to solve complex problems in collaborative, interdisciplinary, and cross-cultural contexts. To date, most evidence about how international experiences and education impact engineering students lacks empirical research to guide educational practices.

Engineering faculty have anecdotally recognized that students who participated in study abroad programs tend to develop such skills as problem solving, cross-cultural communication, and working effectively with culturally diverse teams. Living internationally, especially in a non-English speaking country, prepares students to not only take risks, but to learn to adapt to new environments, develop a greater understanding of contemporary issues, and put engineering solutions in a global and social context. There is general agreement that international engineering education experiences are



beneficial to students, but we don't know empirically the extent that the various experiences contribute to global preparedness, nor do we even agree on what global preparedness is. These experiences are expensive both for the student and for the University that provides the experiences – how can we ensure students are getting an appropriate educational value for their money? How can these experiences be tailored to achieve educational value? How should we advise students based on the individual's background, prior global preparedness, and financial resources so that the experiences are most effective? While this talk will not answer all of these questions, it will shed some light on them, based upon our findings to date.

## **BIORGRAPHY**



Larry J. Shuman is Senior Associate Dean for Academic Affairs and Distinguished Service Professor of Industrial Engineering, University of Pittsburgh. Dr. Shuman is also assisting with the design of curricula for the Sichuan University – University of Pittsburgh Joint Institute (SCUPI) in Chengdu, China. His current research focuses on improving the engineering educational experience, emphasizing assessment of learning and problem solving abilities, with a large NSF sponsored project addressing the effectiveness of various forms international experiences on engineering students' global preparedness. Within the Swanson School of Engineering he has led the development of a very successful cooperative engineering education program and an innovative study abroad program. This latter initiative has included the "Plus3" integrated field trip abroad for rising engineering and business sophomores, which received the 2005 Heiskell Award from the Institute for International Education for "Innovations in Study Abroad," the INNOVATE program with Rice University, and a very active research and educational program for undergraduates in Brazil. He currently chairs the Executive Committee of the Global Engineering Education Exchange (whose membership also includes the Shanghai Jiao Tung – University of Michigan, and the University of Michigan). He served as the Spring 2002 Academic Dean for the Semester at Sea Program. A former senior editor of the Journal of Engineering Education, Dr. Shuman is the founding editor of ASEE's Advances in Engineering Education. He has published widely in the engineering education literature, and is co-author of Engineering Ethics: Balancing Cost, Schedule and Risk - Lessons Learned from the Space Shuttle (Cambridge University Press). He received his Ph.D. from The Johns Hopkins University in Operations Research and the BSEE from the University of Cincinnati. He is an ASEE Fellow.